Clean Air Strategy for Alberta

Report to the Ministers

Extracts

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Report to the Ministers

Extracts

The *Report to the Ministers* is the culmination of the Clean Air Strategy for Alberta public consultation program. In March 1990, the Ministers of Energy and Environment announced the Strategy in response to continuing national and international discussions on the impact of fossil fuels on global warming, acid deposition and smog. These concerns are of particular significance to Alberta, an energy-producing province.

The program was to identify and clarify the most important issues regarding energy-related emissions; to outline practical and achievable actions that can be taken by consumers and producers; and to make policy and program recommendations to government. A representative Advisory Group was appointed (right).

These *Extracts* present the outcome of the process only. For a comprehensive look at energy-related air quality issues, the consultation process and relevant background information please obtain the full *Report to the Ministers*, ISBN 0-86499-871-6, Pub. No. I/437, November 1991, from the Clean Air Strategy for Alberta office (below).

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Other related publications include the three-volume *Report on the Regional Sessions*:

- Volume I is the *Moderator's Report* (ISBN 0-86499-830-9, Pub. No. I/416, 1990-91);
- Volume II is the *Verbatim Transcript* of the public meetings (ISBN 0-86499-831-7, Pub. No. I/417, 1990-91); and
- Volume III is in two parts and contains the *Written Submissions* (ISBN 0-86499-832-5, Pub. No. I/418, 1990-91).

Report to the Ministers and *Report on the Regional Sessions — Volume I: Moderator's Report* have wide circulation and may be obtained at the address below. Volumes II and III of *Report on the Regional Sessions* are on file at many public libraries for public access and for inter-library loan.

Clean Air Strategy for Alberta
Bag One, Mail Room, Main Floor
North Tower, Petroleum Plaza
9945-108 Street, Edmonton, Alberta
T5K 2G6
(403) 427-9793

Advisory Group

Bill Anderson/Bob Feick
Independent Petroleum Association

Nick Bayliss
Alberta Public Health Association

Al Brekke
Electric Utilities Planning Council

Giacomo Capobianco
Coal Association of Canada

Andy Day
Canadian Chemical Producers' Association

Jason Edworthy
Small Power Producers' Association

George Flynn (observer)
Alberta Health

Rob Macintosh
Alberta Environmental Network:
Energy/Clean Air Caucus

David Powell/Doug Bruchet
Canadian Petroleum Association

Phil Prince
Energy Resources Conservation Board

Lillian Staroszik/Sharon Fish
Alberta Urban Municipalities Association

Brian Staszenski
Alberta Environmental Network:
Energy/Clean Air Caucus

Ken Smith
Co-Chairman, Alberta Environment

Norm MacMurchy
Co-Chairman, Alberta Energy

5.0 NEW CHALLENGES

Alberta's existing air quality management system, developed in the 1960s and 1970s, was to maintain local air quality by controlling local industrial emissions. Ambient objectives and "end of stack" standards were established in order to control air pollution at acceptable levels. In the 1980s, new challenges arose through issues like acid deposition, global warming, smog and stratospheric ozone depletion. Notwithstanding that the science for some issues may be uncertain, the public is demanding action from their elected representatives. Governments have responded with pledges and commitments as illustrated in Chapter 2.0, Table 2-2.

5.1 Existing Air Quality Management System

Alberta's current air pollution control program has four main premises:

- emissions from each industrial source must be controlled using the best available demonstrated technology that is economically achievable;
- residual emissions must be dispersed through a stack designed to keep ambient concentrations below the Alberta ambient air quality objectives;
- industrial operators must monitor emissions and the resulting air quality around their facilities and report the measurements to the government;
- cumulative emissions from industrial sources are considered with respect to ambient objectives and regional air pollutant deposition.

Alberta regulations specify maximum permissible concentrations in ambient air for six different contaminants (see Appendix 1). The best available demonstrated technology (BADT) for various industry categories is generally determined by joint government-industry task forces. The recommended emission rates and implementation schedules are formalized as regulations, guidelines and policies, Energy Resources Conservation Board's Informational Letters and other government publications, and are used to set individual licence limits. Based on the "polluter pay" principle, the cost of monitoring is borne by the industry. The government restricts its activities to data quality assurance and spot checks. Licences issued by the government to industrial operations contain a variety of conditions and specify equipment, operations, maximum emission rates, stack limits, source testing, ambient monitoring and data reporting. A tiered enforcement procedure is also in place to ensure compliance with licence conditions. The system achieves two goals:

- emissions from individual industries are minimized using BADT; and
- air quality in the vicinity of industrial operations meets Alberta objectives.

5.2 Problems and Opportunities

To address the emerging challenges, it is essential that the scientific, economic, social and political linkages are considered in developing a clean air strategy. Participants at the Clean Air Strategy Issues and Options Workshop, at the Regional Sessions and through written submissions, identified problems and opportunities that need to be addressed for an effective strategy. While a broad discussion of the scientific information has been outlined in the previous sections, the following areas are considered priorities for Alberta.

5.2.1 Comprehensive Air Quality Management

There is a need for a more comprehensive system for managing air quality in the Province of Alberta.

The current system of monitoring and regulations addresses gaseous emissions of sulphur dioxide, hydrogen sulphide, nitrogen dioxide, carbon monoxide, ozone and particulate.

It is important to review whether the right data is being gathered, how it is being collected and whether it could be better used.

There are a number of other emissions from a variety of sources which may be of concern and are not part of the current provincial air quality management system. These include greenhouse gases, air toxics and odour-causing emissions other than hydrogen sulphide. To obtain a more accurate picture of air quality in the province, ambient air quality levels need to be monitored and environmental and human health indicators need to established so that the public and industry can better understand the effects emissions have on humans and the environment.

Currently, specific emissions are dealt with through separate standards and agreements or protocols. It is now evident that measures taken to control one emission often affect other emissions. For example, measures to decrease emissions of sulphur dioxide or nitrogen oxides may result in increases in carbon dioxide emissions.

Furthermore, health and environmental effects of many emissions and their synergistic effects are not well understood. Systems need to be in place to both involve and inform the public and industry about the health and environmental effects of gaseous emissions, or to effectively research and respond to public concerns regarding air quality.

5.2.2 Local Air Quality

Local air quality issues and problems need to be addressed as a priority.

Participants at the Regional Sessions and several of the written submissions identified specific local air quality issues and problems. These include acid-forming emissions from oil sands plants in Northeastern Alberta, localized impacts from flaring and venting at oil and gas facilities, impacts from coal burning at thermal-power generating stations, air toxics resulting from pulp and paper facilities as well as incinerators, and episodic smog in Edmonton and Calgary. Whatever the source of the emissions, the Regional Sessions showed that the Alberta public appears to be more concerned with these local issues than with national or global issues. As is indicated in the Moderator's Report on the Regional Sessions, "Unless local problems are resolved, national and international commitments will lack credibility in the eyes of the public."

5.2.3 Zone/Regional Air Quality

The air quality management system needs to address cumulative regional emissions and impacts from those emissions.

At present, emission monitoring and control are focused on industrial point sources, rather than airsheds or larger regional zones. This emphasis creates the potential for increases in emissions despite compliance with regulations by individual facilities. At present, the number of sources in a given geographic area and the total mass are minor considerations. An improved means of achieving environmentally sustainable loadings of pollutants of concern, both within and outside of provincial boundaries, must be established. This requires an environmental impact focus which relates total loadings to environmental effects.

5.2.4 Provincial Position on National and International Initiatives

Alberta needs to develop a position which responds to current and anticipated commitments by the federal government to reduce air emissions.

The federal government has made international commitments to stabilize greenhouse gases and nitrogen dioxide emissions in Canada, and will likely make more commitments in the future. Past commitments have been made without adequate consultation. To develop national strategies that make sense, full consultation with interested and affected parties is essential. All commitments have significant implications for Alberta and require provincial government response.

Global warming is one of the important environmental issues facing decision-makers in the world today. The total amount of greenhouse gases from Canada represents only 2 per cent of the global total. However, on a per capita basis Canada and Alberta are large contributors of carbon dioxide. There is an expectation nationally and internationally that jurisdictions in developed countries should move to reduce their emissions of greenhouse gases.

5.2.5 Cost-Effectiveness and Flexibility

There needs to be a strong commitment to include cost-effectiveness and flexibility in the operating principles.

While there are penalties for not complying with standards, there is little incentive for reducing emissions below the standard, or for the adoption of other emission control options. This discourages industrial creativity and innovation to develop processes that further reduce emissions. However, there is opportunity for improved economic/environmental efficiency — the greatest environmental benefit for the resources expended — which will enable more progress in mitigating air quality concerns and problems. This requires a system that sets efficient and effective priorities, and establishes goals, objectives and actions to address specific problems.

5.2.6 Scientific and Economic Uncertainty

Scientific and economic uncertainties need to be addressed for improved decision-making.

Considerable scientific uncertainty and information gaps exist in the areas of air quality, climate modelling, rate of change impacts due to temperature or precipitation changes, and assessment of effects of emissions on human health and the environment. Time, as well as financial and human resources, would be required to enable the information gaps to be filled. However, if actions are delayed until all the scientific uncertainty about effects is resolved, it may be too late to avoid major global environmental impacts and human suffering.

Concerning acid-forming emissions that cause acid deposition, although Alberta has done significant work through the Acid Deposition Research Program and is a world leader in developing emission-reduction technology, there is still much to be done. For example, there is a need to refine appropriate target loadings (ambient acid deposition standards) and to develop reliable methodology for measuring dry deposition.

With respect to greenhouse gases, atmospheric concentrations, rates of increase, and projected changes are now available. There is less certainty about the chemical, meteorological, physical and biological processes that lead to these concentrations or the processes which lead to an impact on climate due to increases in the concentrations of these gases. Thus, the resulting rate of climate change cannot yet be predicted with any reliability, especially at the regional or local level. Furthermore, the reliability of predictions of climate change and its impacts on the environment may not improve substantially over the next few years.

In addition to scientific uncertainty, there is considerable debate about the economic impacts of reducing emissions on Alberta's and Canada's industries. Some suggest that measures taken in isolation to reduce energy-related emissions will increase product costs for the resource or industrial sectors in Alberta — or Canada — relative to other countries, thereby putting Alberta industry at a competitive disadvantage. This could have negative effects on the economy of Alberta. On the other hand, others share the view that if Alberta industry is required to cope with leading-edge environmental policies, it will develop the capacity and innovation required to respond and provide Alberta and Canada's industries with a competitive advantage.

5.2.7 Role of the Public

The greatest challenge to implementing a Clean Air Strategy is to ensure Albertans understand the required commitment and are willing to make the necessary changes.

The results of the Regional Sessions indicate that the public wants action, but generally Albertans are unaware of their part in either directly causing emissions or in creating the demand to which industry responds. They also do not see themselves as having to make lifestyle changes as part of solving these problems. On the other hand, Albertans appear to be deeply concerned about potential health risks associated with local air quality problems. Participants also suggested the need for industry to reduce energy use and increase efficiency as a way of reducing air quality problems.

National public opinion research tends to verify these attitudes. Research indicates the public wants to know that air quality issues are being satisfactorily addressed, but the research also indicates the public sees industry and government as responsible for both the problem and the clean-up. It is not clear how much cost and lifestyle change the public is willing to bear to address national and global air quality issues. There is a need for substantial public education to show how individual actions and choices affect air quality, and what options individuals have for contributing to improved air quality. In other words, Albertans should be informed about the environmental consequences of their lifestyle and consumer behaviour. They should be encouraged to use environmental impacts as an important criteria in resource consumption and purchasing decisions as well as in their broader lifestyle choices.

6.0 STRATEGIC FRAMEWORK

The previous section outlines the air quality challenges facing Alberta, and indicates that there is an incomplete knowledge base on which to make decisions. Given the problems and opportunities facing the province, the Clean Air Strategy for Alberta has chosen an approach that outlines a prudent yet practical framework for decision making, rather than attempting to resolve the issues. The framework provides a vision of the desired attributes of clean air, and includes a mission statement and the principles on which future plans could be based. All of these are founded on the beliefs and values held by Albertans. The following diagram (Figure 6) describes the relationship of the components.

6.1 Overall Vision

This vision of clean air is the guiding star. It is fundamental to the development of an effective air quality management strategy for Alberta.

The air will be odourless, tasteless, look clear and have no measurable short- or long-term adverse effects on people, animals and the environment.

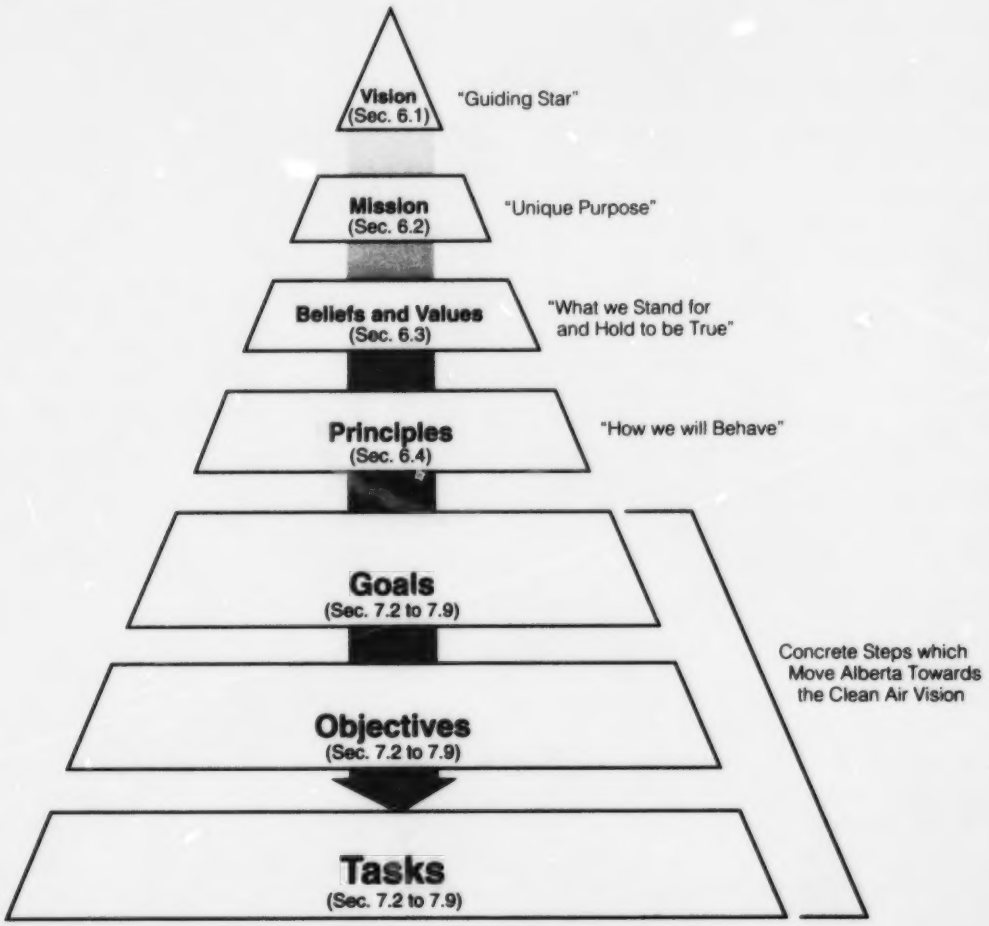

Figure 6. Components of the recommended strategy

6.2 Mission Statement

The vision provides the basis for the development of a mission statement which is as follows:

Alberta's Clean Air Strategy is to provide guidelines for the management of emissions from human activity and encourage appropriate life-styles so as to protect human health and ecological integrity within a provincial, national and international context.

The strategy will be comprehensive but flexible and, through an ongoing consultative process, will employ a wide range of mechanisms available for implementing the strategy, including public education, market-based approaches, legislation, regulation, and research and development.

6.3 Guiding Beliefs and Values

Commonly held beliefs and values, what Albertans stand for and hold to be true, are the basis upon which the strategy is built. These concepts reflect the views of Albertans presented through the Clean Air Strategy for Alberta public consultation process. They are fundamental to the development of an effective air quality management system for the province. At the same time, however, it is important to recognize that solutions to air quality problems must be governed by the availability of financial and human resources. The challenge for Alberta will be to find innovative solutions that are cost-effective (maximum emission reduction for minimum cost), and which are developed on a focused and prioritized basis. The following beliefs and values have been identified through the Clean Air Strategy for Alberta process (see Appendix 3 for explanatory notes on these beliefs and values).

Health, Quality of Life and Education

- Human health and ecological integrity within the province must be protected.
- Albertans have an obligation to their children and future generations to pass to them a healthy environment.
- Human health, environmental quality and the economy are interdependent and inseparable.
- Air quality management and decision-making must strive to use cooperative and constructive processes rather than adversarial approaches.
- An educated and motivated public, which is able to make sound life-style choices, is essential to the development and implementation of a successful clean air strategy.
- Full public access to information and involvement in decision-making for air quality is essential.

Equity

- Fairness in recommendations and actions is essential.
- All consumers should share fairly in the costs and benefits of reducing emissions.
- All suppliers of energy resources or services should be given an equal opportunity to contribute to a healthy environment and a sound economy.

Coordination and Interrelationships

- Addressing local and regional air quality problems is a priority.
- Albertans must work to alleviate their share of national and international air quality problems.
- Albertans have a leadership role to play in solving air quality problems.
- The various levels of government share responsibility for air quality management and must coordinate their efforts to avoid duplication of efforts.
- Encouraging wise use of energy use and striving to optimize energy conservation and efficiency are essential.

Science and Research and Development

- Alberta's strengths in technology, new technology development and services can be used to help resolve air quality problems and to diversify and strengthen the economy.
- Air quality should be managed on the basis of sound scientific information and appropriate risk management.

6.4 Principles

Building on the beliefs and values developed through the Clean Air Strategy for Alberta, a number of principles were established that will be used to guide planning and actions. The following principles are guidelines that will help to translate the beliefs and values into decisions and behaviours:

Health, Quality of Life and Education

- The protection of human health and ecological integrity are fundamental considerations.
- Important consideration must be given to economic well-being and quality of life.
- The public must be informed about air quality in the province and aware of their individual roles in both the problems and solutions.

Equity

- Alberta's environmental, economic and social interests relative to other jurisdictions must not be jeopardized in implementing actions.
- The costs and benefits of implementing measures must be shared fairly among all sectors, including consumers.
- The potential impacts of clean air policies and programs on low income Albertans must be addressed.
- The management of air quality must be approached on the basis of a full assessment of direct and indirect environmental, social and economic costs and benefits.

Coordination and Interrelationships

- Cooperation with the federal government and other provinces must be ensured in setting and, where appropriate, in harmonizing air quality objectives without compromising provincial standards.
- It must be recognized that air quality issues at point sources within zones, regions, nationally and internationally are interrelated and must be addressed as such.
- Where appropriate, provincial expertise in technology and services must be shared with others (especially less-developed countries).

Science and Research and Development

- Sound, scientific information about emissions and their environmental and health impacts must be used to form the basis of air quality management decisions and strategies.
- Scientific and economic factors, and other uncertainties are to be addressed using sound management principles and risk assessment.
- Scientific understanding of air chemistry and transport must be enhanced in order to build better practical models and improve theoretical understanding.
- Research and technology development must be encouraged in order to fill knowledge gaps and to develop new ways to prevent, reduce or eliminate undesired emissions and/or increase efficiencies.
- Development of cleaner energy sources must be fostered.

Key Thrusts

- Full consultation with affected and interested Albertans must be an integral component of air quality management and decision-making.
- The most cost-effective measures which achieve the greatest human health and ecological benefits must be implemented.
- The most appropriate approaches to prevent or reduce emissions must be selected from among the range of mechanisms, including public education, market-based approaches and regulations/standards.
- Cost-effective energy efficiency must be maximized and energy conservation must be promoted as a priority.
- Local and regional air quality problems are to be addressed as priorities.
- Encouraging individuals to take actions that contribute to cleaner air must be a priority.
- Emission reduction and energy efficiency technologies and services must be pursued as potential opportunities for economic development and export.

7.0 RECOMMENDED STRATEGY

A comprehensive system to respond to present and emerging air quality issues is presented. It is built on the strategic framework developed by the Clean Air Strategy for Alberta (discussed in Section 6.0). General goals and specific objectives are also recommended. Tasks in support of specific goals are proposed for improving air quality management.

It is noteworthy that several criteria were considered in designing the recommended strategy. The criteria provide a logical and orderly approach to decision making. The criteria were employed in a qualitative manner and applied by the Advisory Group and Summary Workshop participants to the recommendations from the Issues and Options Workshop, to the information gathered from the Regional Sessions and to written submissions. The criteria are:

Criteria Used for Developing the Strategy

- It is recognized that considerable time will be required to achieve many of the goals and objectives. The resources required to achieve the goals will need to be balanced with other claims on provincial resources.
- Cost-effectiveness is essential. Changes in consumer behaviour, and in the energy industry and other sectors, will require significant investments over time. Recognizing the potential economic benefits associated with energy conservation and efficiency, investments to reduce emissions are likely to be large enough to affect the economy in various ways. Therefore, it is sensible to seek reductions at the lowest cost.
- A least-cost strategy by itself is not a satisfactory criterion. Flexibility in the approaches used to achieve goals is critical, especially if objectives to achieve the goals are to be economically viable. Innovative approaches need to be part of the strategy.
- Agreed-upon problem definition and priority setting are also considered essential. The problem definition criterion used by the Clean Air Strategy for Alberta is "significance to Alberta." The priority setting criteria employed are a mix of "ease of implementation" and "significance to Alberta."
- The term management, as defined by the Clean Air Strategy for Alberta, means to identify, monitor, assess and where required, respond, reduce and follow-up.

Energy efficiency and conservation can be regarded as means to enhance air quality. Due to their important potential to reduce energy-related emissions, they are given special emphasis as separate goals. Many energy efficiency and conservation measures have significant potential to reduce energy-related emissions with a net savings, or at low net cost, but have not been implemented because of established social and behavioural habits, lack of awareness, uncertainty regarding the economic impacts, policy and legislative obstacles and market penetration barriers. Note: net savings means there would be a net return on the expenditure, rather than that no expenditure is required to implement.

Seven types of goals have been identified. These are:

- comprehensive air quality management system (Section 7.1, Goal A)
- energy efficiency, conservation and renewables (Section 7.2, Goals B, C and D);
- point source (Section 7.3, Goals E and F);
- zone (Section 7.4, Goals G and H);
- regional (Western Canada in Section 7.5, Goal I);
- national/international (Section 7.6, Goal J); and,
- general (Section 7.7, Goals K, L and M).

Many objectives may apply to more than one goal, but the objectives are listed only once. The recommended goals for the Clean Air Strategy for Alberta are listed below.

Clean Air Strategy for Alberta Strategic Goals

Comprehensive Air Quality Management System

Goal A
Implement a comprehensive air quality management system in Alberta that allows for identification of problems, prioritization of issues, allocation of resources, development of action plans and is based on full multi-stakeholder involvement.

Energy Efficiency and Conservation

Goal B
Identify, evaluate and implement legislative and regulatory opportunities for energy efficiency and conservation.

Goal C
Identify, evaluate and implement cost-effective energy conservation and efficiency opportunities.

Goal D
Identify, promote and implement cost-effective energy developments that contribute to clean air.

Point-Source

Goal E
Strengthen the management approach for all point-source emissions in Alberta in order to avoid adverse effects on human health and the environment.

Goal F
Identify and evaluate a range of options available for managing point-source emissions to encourage greater innovation, improved environmental protection and cost-effectiveness.

Zone

Goal G
Develop and implement a zone approach to managing air quality within specific airsheds.

Goal H
Develop innovative and targeted solutions to better manage cumulative emissions in and around urban areas.

Regional

Goal I
Manage emissions within Western Canada to address regional air quality problems.

National/International

Goal J
Encourage collaboration between the provinces and the federal government to pursue actions that are cost-effective and ensure maximum flexibility in addressing national and international air quality issues.

General

Goal K
Improve the gathering, sharing, integration and application of scientific, technical knowledge and research regarding atmospheric processes and effects on health and ecosystems.

Goal L
Improve public awareness of air quality and enhance the public's capability of making choices and commitment to change through environmental education.

Goal M
Integrate clean air goals into the provincial economic development strategy.

There is broad-based support for improving the way air quality is managed in the province in order to better address present and emerging challenges. To meet these challenges the Clean Air Strategy for Alberta recommends that Goals B through M and their objectives and tasks be addressed using the air quality management system in Section 7.1. There is strong belief that a number of objectives and tasks particularly related to energy efficiency, environmental education and Alberta's position on greenhouse gases should be considered for immediate implementation. Decisions on and implementation of these recommendations, that are marked with a star (★), should be undertaken as soon as possible.

7.1 Comprehensive Air Quality Management System

Goal A

Implement a comprehensive air quality management system in Alberta that allows for identification of problems, prioritization of issues, allocation of resources, development of action plans and is based on full multi-stakeholder involvement.

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Objective A-1

An expanded multi-stakeholder Clean Air Advisory Committee should be established, with a secretariat, and a mandate to:

- ▲ guide the implementation of the comprehensive air quality management system; monitor its effectiveness toward meeting approved goals and objectives; and consider additional management options; and
- ▲ address other air quality issues integral to clean air such as air toxics, indoor air and other issues arising out of the agriculture, forestry and other sectors. Please see Appendix 4 for a discussion on air toxics and emissions from non energy sources

The organizational structure in Figure 7 illustrates the inter-relationships.

This objective is proposed with the understanding that air quality issues are dynamic in nature and that to effectively resolve them, it is necessary to obtain the expertise and commitment of a broad range of interested or affected parties.

Public input is essential for four important reasons:

- ▲ to bring the benefits of diverse knowledge and experience to the process;
- ▲ to ensure public commitment to plans and actions;
- ▲ to ensure the most efficient and effective solution is identified and applied to a specific issue or problem; and
- ▲ to implement democratic principles and ensure that citizens and industry have the opportunity to influence decisions which will affect them.

Potential parties associated with air quality management would include representatives from the public, industry and government. Their involvement should occur at every step of the air quality management system.

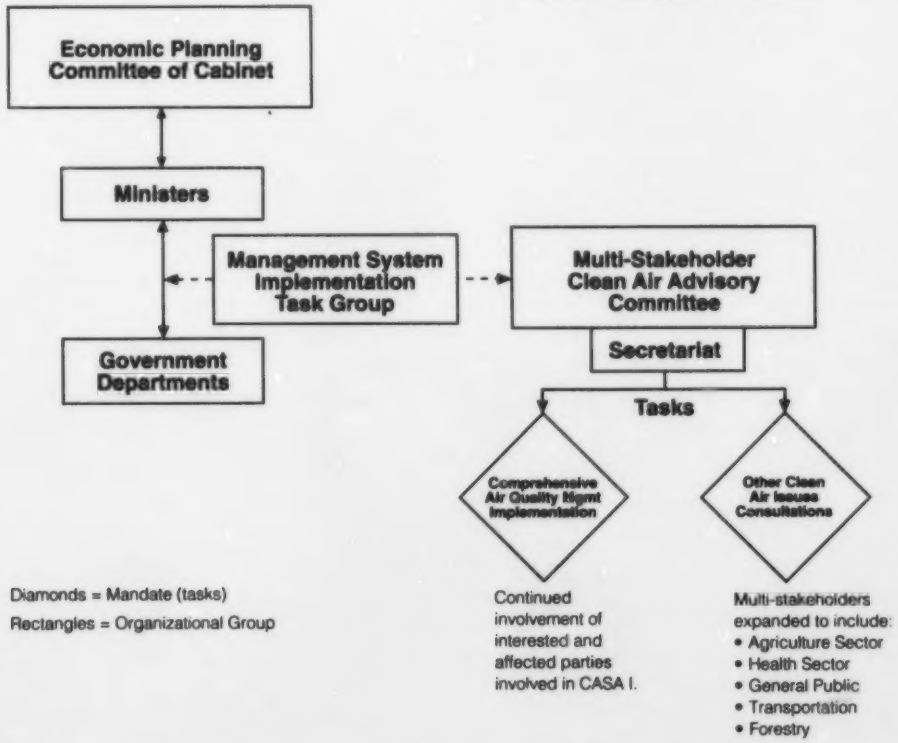

Figure 7. Clean Air Strategy for Alberta implementation organizational structure

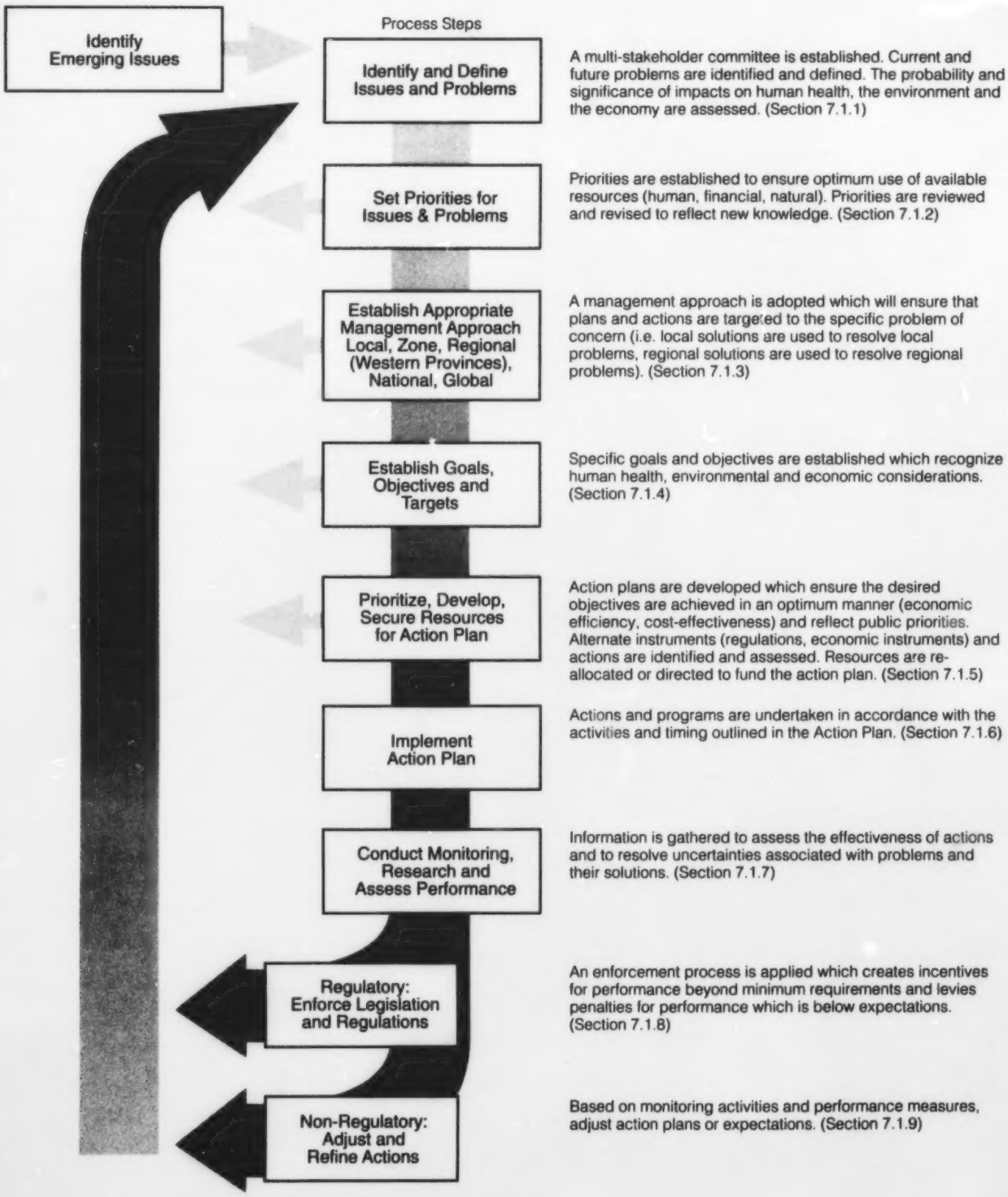
Identify Emerging Issues
Process Steps
Identify and Define Issues and Problems
A multi-stakeholder committee is established. Current and future problems are identified and defined. The probability and significance of impacts on human health, the environment and the economy are assessed. (Section 7.1.1)
Set Priorities for Issues & Problems
Priorities are established to ensure optimum use of available resources (human, financial, natural). Priorities are reviewed and revised to reflect new knowledge. (Section 7.1.2)
Establish Appropriate Management Approach Local, Zone, Regional (Western Provinces), National, Global
A management approach is adopted which will ensure that plans and actions are targeted to the specific problem of concern (i.e. local solutions are used to resolve local problems, regional solutions are used to resolve regional problems). (Section 7.1.3)
Establish Goals, Objectives and Targets
Specific goals and objectives are established which recognize human health, environmental and economic considerations. (Section 7.1.4)
Prioritize, Develop, Secure Resources for Action Plan
Action plans are developed which ensure the desired objectives are achieved in an optimum manner (economic efficiency, cost-effectiveness) and reflect public priorities. Alternate instruments (regulations, economic instruments) and actions are identified and assessed. Resources are re-allocated or directed to fund the action plan. (Section 7.1.5)
Implement Action Plan
Actions and programs are undertaken in accordance with the activities and timing outlined in the Action Plan. (Section 7.1.6)
Conduct Monitoring, Research and Assess Performance
Information is gathered to assess the effectiveness of actions and to resolve uncertainties associated with problems and their solutions. (Section 7.1.7)
Regulatory: Enforce Legislation and Regulations
An enforcement process is applied which creates incentives for performance beyond minimum requirements and levies penalties for performance which is below expectations. (Section 7.1.8)
Non-Regulatory: Adjust and Refine Actions
Based on monitoring activities and performance measures, adjust action plans or expectations. (Section 7.1.9)

Figure 8. A comprehensive air quality management system

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Objective A-2

Establish a task group to develop and implement the processes needed for the comprehensive air quality management system as described in Sections 7.1.1 through 7.1.9.

Description of the Comprehensive Air Quality Management System

The recommended air quality management system is made up of the process steps shown in Figure 8. While the steps identified are seldom separate and distinct, they do describe the process and range of activities to be considered in developing a solution-oriented approach to air quality management. The proposed process would help anticipate and prevent issues from becoming problems that might be difficult to manage. As well, it can provide the tools to manage significant air quality issues in Alberta in an effective, efficient and timely manner.

The concepts described in the first five steps have been used to develop the Clean Air Strategy for Alberta. Once the comprehensive air quality management system is further developed, this process can be applied with varying rigor and complexity to local, zone, regional and national/international issues or problems.

7.1.1 Identify and Define Issues and Problems

The first step to providing effective management of air quality is to have the interested and affected parties (the stakeholders) clearly identify the specific air quality issues or problems (current or anticipated), and the nature and significance of their environmental and/or health effects. The identification and definition of air quality issues or problems, should:

- describe emission types, amounts, and dispersion characteristics;
- assess or predict effects of emissions; and
- assess the probability and significance of the effects of emissions on health, socio-economics and the biophysical environment.

Applying this step would ensure that air quality issues are identified in a pro-active manner, and that plans and actions would be directed towards resolving a specific air quality issue(s) based on the best available knowledge.

The public also has a major role to play in the preliminary identification of potential problems and in bringing them to the attention of those responsible for the management system. Sufficient resources should be made available to examine perceived or reported problems and assess emission levels and health or ecological impacts. The system should ensure that concerns are acted upon promptly.

7.1.2 Set Priorities for Issues and Problems

After current and potential air quality issues have been identified and defined, priorities should be set to ensure available resources (human, financial, institutional and natural resources) are used efficiently and effectively.

Because stakeholders would be directly affected by choices, and should be committed to the actions, they need to be involved in identifying and defining problems and establishing priorities. It is important that priorities are objectively established using mutually agreed- upon criteria and the best available information. Suggested criteria could include:

- human health effects;
- biophysical impacts;
- economic impacts;
- urgency; and
- regulatory compliance.

The setting of priorities should be an ongoing process which responds to the changing nature of factors which influence the management of air quality. Priorities should be reviewed periodically, in response to new knowledge or as progress is made.

7.1.3 Establish Appropriate Management Approach

Stakeholders should focus planning and actions on addressing spatially defined, pollutant-specific air quality issues/problems. The management approach for a specific problem may be local, zone, regional (i.e. Western Canada) or national/international in nature depending on its characteristics. Adopting an appropriate management approach would ensure that plans and actions are targeted to the specific issue or problem. This would ensure that resources are applied effectively and commitment is obtained from affected stakeholders.

For example, the Clean Air Strategy for Alberta supports the use of zone-targeting as a new approach to managing area-specific air quality issues. Zone management would complement, not replace, a system of province-wide minimum ambient standards and minimum recovery guidelines. This would enable the province to establish an air quality management zone(s) that includes sources and areas affected on a defined basis to facilitate management of specific existing or potential air quality problems. For example, a zone could be established to define an urban area where urban smog/ground-level ozone may be a problem. Plans and actions would be targeted within the zone to ensure the problem is appropriately managed. Plans and actions should be developed with involvement of stakeholders within the zone as well as other interested and affected parties. This approach is not possible with the current regulatory system.

7.1.4 Establish Goals, Objectives and Targets

After stakeholders have set priorities for air quality issues and have established an optimum management approach, they should determine goals, objectives or targets for the emissions of concern using the following factors:

- ▲ environmental and social effects;
- ▲ effects on human health; and
- ▲ costs.

7.1.5 Prioritize, Develop and Secure Resources for Action Plan

Action plans would be developed which ensure objectives are achieved in an optimum manner (economic efficiency, cost-effectiveness) and reflect public priorities. Alternate instruments (regulations, economic instruments) and actions would be identified and assessed. Resources would be re-allocated or directed to fund the action plan.

7.1.6 Implement Action Plan

Solutions applied to address specific problems should encourage innovation and cost effectiveness. This would require that alternative approaches to current regulations, such as various economic instruments (i.e. tradeable permits, taxes/fees etc.) be available as options. This would ensure that for any problem the province has the capability to apply the most effective instrument to achieve the desired effect.

7.1.7 Conduct Monitoring, Research and Assess Performance

Experience with implemented actions should be closely monitored and research efforts enhanced throughout the province to support the management of air quality. Periodic assessment of progress should be built into the system. Current efforts are focused primarily on compliance testing which is valid and important but does not allow for timely assessment and analysis of air quality trends (i.e. progress towards achieving established goals/targets and support for decision-making). This would require improved data management, as credibility of the data and analysis is crucial. Thus, the public should be involved in the design of the ambient air quality monitoring system and in its operation. As well, data and reports should be presented in a straight-forward, comprehensible manner and prompt public access to all information should be ensured.

7.1.8 Enforce Legislation and Regulations

Enforcement is important to ensuring progress on achieving established goals/targets. The enforcement process should create incentives for those who perform beyond requirements, and should establish significant penalties for those who do not perform up to requirements.

7.1.9 Adjust and Refine Actions

For programs not needing regulations, it is also important to ensure progress is made. All programs should adapt to new information and performance measures.

The Clean Air Strategy for Alberta recommends that Goals B through M and their objectives and tasks be addressed using the air quality management system in Section 7.1. There is strong belief that a number of objectives and tasks particularly related to energy efficiency, environmental education and Alberta's position on greenhouse gases should be considered for immediate implementation. Decisions on and implementation of these recommendations (i.e. marked with a star) should be undertaken as soon as possible.

7.2 Energy Efficiency and Conservation

Goal B

Identify, evaluate and implement legislative and regulatory opportunities for energy efficiency and conservation.

★

Objective B-1

Incorporate appropriate energy efficiency performance requirements, consistent with other leading jurisdictions, into the Alberta Building Code for houses and buildings.

Task

Using the proposed management system, Alberta Energy and Alberta Labour should undertake a review of options for incorporating energy efficiency requirements into the Alberta Building Code. The review would include an assessment of the relevant legislation and identification of required amendments. The review would also focus on required changes in the membership of the Building Standards Council to provide appropriate balance.

The interdepartmental review should start in 1992 and the code amended by 1993.

★

Objective B-2

Develop and enact an energy efficiency act for Alberta which specifies minimum efficiency standards for both gas and electric appliances, furnaces, heaters, and for lighting, motors and other suitable equipment.

Task

Alberta Energy should undertake a comprehensive review of energy efficiency acts in other jurisdictions. Using the proposed management system, Alberta Energy would draft an Energy Efficiency Act for Alberta which specifies minimum efficiency

standards for both gas and electric appliances, furnaces, heaters, and for lighting, motors and other suitable equipment.

The survey work and Energy Efficiency Act should be completed in 1992 and tabled in spring of 1993. A schedule for developing regulations would accompany the act.

★

Objective E-3

Review and, where necessary, revise the utility regulatory process to remove barriers and create incentives which would ensure that a wide range of energy efficiency programs could be pursued by the utilities and their consumers. This should include changes which promote a more cooperative process of approving demand-reduction programs by the Public Utility Board.

Task

Using the proposed management system, Alberta Energy should coordinate a comprehensive review of utility regulatory policy used in other jurisdictions which encourage cost-effective energy efficiency choices by consumers. Barriers to cost-effective energy efficiency choices in Alberta should also be identified.

This review should be completed in spring of 1992. Institutional responses considered appropriate for Alberta should be developed and tabled by the end of 1992.

Goal C

Identify, evaluate and implement cost-effective energy conservation and efficiency opportunities.

★

Objective C-1

Develop and implement comprehensive energy management planning and programs for provincially-funded facilities.

Task

Alberta Public Works, Supply and Services should extend the Energywise program to a government-wide effort to plan and implement energy management in government facilities and facilities receiving government funding. Government should be a leader in adopting the most up-to-date energy saving techniques and technology and should encourage corporations and municipal governments within the province to voluntarily adopt similar techniques and technologies.

Program should be announced early in 1992.

★

Objective C-2

Establish provincial government fleet fuel efficiency standards. These would be strengthened as vehicle efficiencies improve. Work with municipalities and the corporate sector to establish similar programs.

Task

Incorporate fleet fuel efficiency standards into objectives for provincial government fleet management and purchase programs. Establish a mechanism to encourage corporate and municipal vehicle fleets to voluntarily adopt the objectives.

Program should be announced early in 1992.

Objective C-3

Develop and implement a revenue-neutral gas-guzzler fee and gas-sipper rebate program for purchase of new vehicles in Alberta that will encourage consumers to select the most fuel-efficient vehicles.

Task

Evaluate similar programs in other jurisdictions and develop options to implement a revenue-neutral gas-guzzler fee and gas-sipper rebate program in Alberta which would encourage consumers to select the most fuel-efficient vehicles available.

Research should begin in 1992.

★

Objective C-4

Evaluate, develop and implement aggressive and comprehensive provincial programs to encourage energy efficiency and conservation. The programs should reach all sectors and include all the stakeholder groups in the provincial delivery system. Programs also should include energy audits and appropriate incentive mechanisms.

Task

Using the proposed management system, Alberta Energy should coordinate an evaluation of the scope, coverage, coordination and effectiveness of energy conservation and efficiency awareness, information and education services in Alberta. Concepts for programs would be prepared to expand these services, resulting in a comprehensive slate of services affecting all energy consuming sectors. Incentives to encourage the implementation of measures and funding for utility company-sponsored programs and non-governmental groups would be included in the review. A means of coordinating all complementary services would be recommended.

Concepts for programs should be prepared starting in 1992.

★

Objective C-5

Develop and implement educational and incentive programs to encourage consumers to select high-efficiency appliances, furnaces, motors, lighting and other equipment.

Task

Using the proposed management system, Alberta Energy should coordinate development and implementation of educational and incentive programs to encourage consumers to select high-efficiency appliances, furnaces, motors, lighting and other equipment.

This should be completed in 1992.

Objective C-6

Develop and implement innovative programs to encourage upgrading and retrofitting of existing housing and commercial buildings to achieve higher energy efficiency performance.

Task

Within the proposed management system, Alberta Energy should coordinate development of innovative programs for improving energy efficiency in existing houses and buildings (e.g. market-based incentive programs).

Recommended programs should be implemented by mid-1993.

Objective C-7

Assess and encourage the offering of upgrading and certification programs for building trades and building design professionals to increase their capability to incorporate energy conservation practices and technologies into construction.

Task

Alberta Energy and Alberta Advanced Education, in collaboration with the appropriate educational institutions, Alberta Career Development and Employment, apprenticeship programs and interested stakeholder groups should review opportunities for improving energy efficiency construction practices and technologies in Alberta (i.e. development of curriculum, delivery of information or education programs and identification of new technologies). Recommendations for changes and implementation of programs that would permit the affected stakeholders to keep pace with energy-efficient building codes, construction practices and technologies and developments elsewhere should be included as amendments to the Alberta Building Code.

Education and information programs should be implemented in 1993.

Goal D

Identify, promote and implement cost-effective energy developments that contribute to clean air.

Objective D-1

Identify the levels of provincial support for, and royalties and taxes from, various energy sources (e.g. fossil fuel developments, utility projects, clean energy technologies systems, renewable energy development and conservation and efficiency measures). This information should then be used to help ensure that future provincial subsidies and incentives encourage energy developments that contribute to clean air.

Task

Within the proposed management system, Alberta Energy should coordinate compiling information on the levels of provincial support (subsidies, incentives, economic-development assistance, research and development support, government loans) for, and taxes and royalties from, the various energy sectors within the province. The impact on clean air should be highlighted and this information should be made available to the public. The information should be used to adjust provincial energy development subsidies and incentive programs where appropriate.

The survey should be done in 1992.

Objective D-2

Investigate and consider how to implement full-cost analysis to take into account environmental and socio-economic implications of various energy sources for energy projects in government decision making.

Task

Within the proposed management system, the Energy Resources Conservation Board should coordinate development of criteria for full-cost analysis to be applied in the evaluation of energy projects. All options should be considered. This analysis should be tested and reviewed. Any new system also would need to be applied to non-energy projects through the Natural Resources Conservation Board.

Full cost analysis should be piloted in 1994.

★

Objective D-3

Revise government policy to allow for flexibility in the sources of energy used for generation of electricity and to encourage conservation. This includes developing fair mechanisms to allow for environmentally-sound commercial projects and utility-entrepreneur joint projects that contribute to cleaner air.

Task

Within the proposed management system, Alberta Energy should identify the range of available mechanisms to achieve flexibility in the sources of energy used for generation of electricity and make recommendations for legislative, policy and program changes if required. A priority area of focus should be on those cost-effective projects which lead to an overall reduction in air emissions for Alberta but are faced with access and rate issues which affect their viability within the Alberta interconnected system.

The work is to commence in 1992 with recommendations to be developed by the end of 1993.

7.3 Point Source

Goal E

Strengthen the management approach for all point-source emissions in Alberta in order to avoid adverse effects on human health and the environment.

Objective E-1

Develop new approaches for managing all point-source emissions to avoid adverse effects on human health and the environment. This should include the following components:

- developing a more effective monitoring system structured to enhance public credibility;
- developing better provincial inventories of point-source emissions such as methane, volatile organic compounds, and air toxics;
- defining, prioritizing and implementing a management system to include a broader range of emissions and sources that are monitored and regulated;
- identifying substances that may be a factor in human health including substances from non-energy-related emissions and air toxics;
- developing standards (regulations or other management mechanisms) for the broader range of emissions;
- developing and implementing a revised enforcement policy; and
- improving the system for exchanging information with the public, particularly regarding health concerns.

Task

Within the proposed management system, Alberta Environment should coordinate development of a new approach for managing all point-source emissions.

Work toward revising the management of point-source emissions to begin in 1992.

Objective E-2

Conduct a comprehensive review of gas-flaring practices, guidelines and regulations and make recommendations regarding opportunities for improving air quality.

Task

This review should be coordinated by Alberta Environment within the proposed management system.

Recommendations would be made in time to be incorporated into the new regulations of the Alberta Environmental Protection and Enhancement Act.

Objective E-3

Encourage research and technological development to develop new ways to eliminate, reduce, recapture and dispose of emissions.

Task

Within the proposed management system, an Alberta Environment task group should be established to coordinate ongoing and anticipated research.

The program should start in 1993.

Goal F

Identify and evaluate a range of options available for managing point-source emissions to encourage greater innovation, improved environmental protection and cost-effectiveness.

Objective F-1

Review and prioritize the options available to manage point-source emissions and build consensus for those that are most appropriate for controlling specific sources or combinations of sources and ensure the regulatory system allows for flexibility in management approaches.

Task

Within the proposed management system, the Energy Resources Conservation Board and Natural Resources Conservation Board should jointly review management options (e.g. standards, incentives, tradeable emissions permits, emission charges/taxes) and the existing regulatory framework. Recommendations should be coordinated with the development of new regulations for the Alberta Environmental Protection and Enhancement Act. (Note: this task should be closely coordinated with Goal E and the associated objectives and tasks.)

The review should begin in early 1992.

7.4 Zone

Goal G

Develop and implement a zone approach to managing air quality within specific airsheds.

Objective G-1

Establish a new approach for dealing with identified air quality problems in specific zones throughout Alberta. The definition of a zone would be based on the following criteria:

- emission sources and volumes
- emission dispersion characteristics
- impacts of emissions
- administrative considerations

The new approach should include:

- managing emissions, from both point and non-point sources, within specific zones to meet existing standards;
- improving existing air quality standards within specific zones where necessary;
- ensuring ecological integrity within zones;
- managing the combined effects of a concentrated number of point sources;
- establishing zones within Alberta and Western Canada based on need, nature of emissions and problems and what it is anticipated will be accomplished;
- establishing a decision-making mechanism for determining when an air quality problem is appropriate and significant enough for a zone approach (e.g. smog in Calgary or Edmonton, sulphur emissions in northeastern Alberta or the Caroline area);
- creating a mechanism for defining and officially recognizing a zone;
- determining the roles of government, industry, the public and regulatory bodies (ERCB, NRCB) in problem solving (i.e. advisory or decision making) and defining appropriate mechanisms for accommodating those roles (e.g. multi-stakeholder regional air quality committee; regulatory hearings);
- ensuring that decision-making procedures adequately consider total emissions, cumulative effects and ecological integrity;
- ensuring that zone management is integrated with point-source emission management; and
- ensuring that zone management is integrated with provincial and national emission management.

Task

Within the proposed management system, this review should be coordinated with the review of point-source emissions (Section 7.3, Goals E and F) to develop a complementary and comprehensive approach to the management of air quality for zones within the province.

Recommendations should be made by the end of 1993.

Goal H

Develop innovative and targeted solutions to better manage cumulative emissions in and around urban areas.

Objective H-1

Develop and implement innovative solutions to air quality problems arising from urban transportation.

Task

Within the proposed management system, a task group should be formed to develop new approaches to better manage urban transportation. For example, the group could assess measures including innovative urban planning, greater support for mass transit and funding for municipal bicycle trails, parking and bicycle-carrying equipment on transit vehicles. Tasks would involve identifying mechanisms, roles and responsibilities, adjustments to institutional or policy arrangements and assessment of costs and benefits.

The task group should be formed in early 1992 and recommendations should be tabled by the end of that year.

★

Objective H-2

Design and implement a mandatory vehicle-emissions testing program for urban centres in Alberta.

Task

Using the proposed management process, Alberta Environment, Alberta Energy and the Solicitor General should coordinate a survey of vehicle-emissions testing programs in other jurisdictions as well as financial incentive programs for purchasing and/or operating fuel-efficient vehicles and disincentives for inefficient vehicles. The cost-effectiveness and social impacts of these programs also would be evaluated, including investigating means to reduce economic impacts on low-income groups.

A program would be designed for Alberta as well as a discussion of costs and benefits by the end of 1992.

7.5 Regional

Goal I

Manage emissions within Western Canada to address regional air quality problems.

Objective I-1

Develop a decision-making system for managing regional air quality problems. This should include:

- meeting existing provincial standards;
- supporting and strengthening ties among the western provinces and territories including the Western Provincial/Territorial Air Quality Issues Coordinating Committee (a committee with representatives from departments of Energy and Environment in four western provinces and two territories);
- establishing mechanisms for industry and public consultation on specific regional air quality issues (e.g. bilateral agreements between provinces and with federal government);
- ensuring that the position the Alberta government takes to the Committee is consistent with public input on provincial issues (e.g. consistent with the principles of the Clean Air Strategy for Alberta);

- ▲ focusing on the distinctive characteristics of air quality issues in Western Canada (e.g. the predominance of energy-related emissions);
- ▲ integrating economic and environmental considerations in solving regional air quality problems;
- ▲ identifying, monitoring and managing the import and export of point-source emissions;
- ▲ developing appropriate decision-making mechanisms to manage regional problems on an ongoing basis; and
- ▲ deciding who makes what decisions within the Western Canada region.

Task

Alberta should encourage the Western Provincial/Territorial Deputy Ministers and Air Quality Issues Coordinating Committee to develop a comprehensive strategic plan. The plan should consider the strategies developed by the participating jurisdictions and incorporate the needs of stakeholder groups. This effort should be coordinated with actions taken to reform the ambient air monitoring system.

The plan should be developed by the end of 1993.

7.6 National/International

Goal J

Encourage collaboration between the provinces and the federal government to pursue actions that are cost-effective and ensure maximum flexibility in addressing national and international air quality issues.

★

Objective J-1

Alberta should endorse the recommended Alberta position statement regarding greenhouse gases on page 60.

Objective J-2

Identify a cooperative and integrated range of options to reduce emissions at the national and international level in order to better position Alberta and Canada in international discussions.

Objective J-3

Initiate a multi-stakeholder task force to develop capture and recovery strategies for greenhouse gases, with methane as the first priority.

Objective J-4

Work with the federal government to develop an economic development strategy that encourages the export of energy efficiency, renewable energy, clean fossil fuel combustion and pollution-control technologies and services.

Objective J-5

Encourage the federal government to pursue mandatory vehicle-efficiency standards to ensure automakers offer vehicles to consumers which are increasingly fuel efficient.

★

Objective J-6

Work with the federal and other provincial governments to obtain reliable national inventories of greenhouse gases.

Task

Alberta Environment and Alberta Energy should work with the federal and provincial governments directly and through the Canadian Council of Ministers of Environment and the Energy Ministers to bring forward Alberta's position and to establish inventories. Both ministries should continue to encourage stakeholder involvement in the development of a comprehensive national strategy.

Objective J-7

Investigate sulphur-recovery requirements for all industries within the context of the Canadian sulphur dioxide cap.

Task

Initiate a multi-stakeholder task group which, using the proposed management system, will review and assess sulphur dioxide emissions, their impacts and recovery strategies.

7.7 General

Goal K

Improve the gathering, sharing, integration and application of scientific and technical knowledge and research regarding atmospheric processes and effects on health and ecosystems.

Objective K-1

Identify more consistent and readily detectable adverse effects on ecosystems, human and animal health and physiological adaptation resulting from changes in ambient air quality. Correlate these effects with levels of exposure and thresholds of effect. Priority should be given to the most sensitive receptors and its largest sources.

Task

Within the proposed management system, Alberta Environment and Alberta Health should coordinate an integrated, comprehensive research program to address these issues as they pertain to Alberta. It is essential that this initiative be coordinated with other national and international efforts.

Programs should start in 1993.

Objective K-2

Review and develop a series of environmental indicators that are representative and indicative of human and environmental health and which are understandable for reporting on air quality management progress.

Task

Within the proposed management system, Alberta Environment and Alberta Health should convene a task group to develop a set of agreed-upon indicators. The group would coordinate its efforts with similar efforts underway at the national level.

The task group should be convened in early 1992 with recommendations for a preliminary set of indicators by the beginning of 1994.

Objective K-3

Undertake research and technology development activities in support of clean air goals.

Goal L

Improve public awareness of air quality and enhance the public's capability of making choices and commitment to change through environmental education.

★

Objective L-1

Coordinate and support the development and expansion of environmental education and public awareness programs within Alberta.

Task

A multi-stakeholder task group should be established to evaluate current environmental education and information efforts as to their scope, coverage, coordination and effectiveness. Appropriate providers of information, delivery infrastructure, audience and evaluation criteria should be considered. Concepts for programs should be prepared to expand services where appropriate. (Note: task group would need to coordinate efforts with the group focusing on energy conservation and efficiency education programs.)

Task group should convene in 1992 with recommendations prepared by 1993.

Goal M

Integrate clean air goals into the provincial economic development strategy.

Objective M-1

Develop specific components of a provincial economic development strategy to support commercialization and export of energy efficiency and renewable energy technologies and services and state-of-the-art clean fossil fuel combustion technologies and services.

Tasks

Alberta Economic Development and Trade should convene an additional special session of *Toward 2000 Together* to deal specifically with environment and economy issues.

Alberta Economic Development and Trade should establish a business development program geared to developing business opportunities for the private sector in the fields of energy efficiency and clean coal technology, including commercialization and export assistance.

A data base on products and services and a directory of firms should be established starting in late 1992. Business development incentives should be in place in 1993.

7.8 Summary Tables

The following tables are an abbreviated form of the text in Section 7.0. The headings (categories of goals) relate to the section numbers in the text (e.g. 7.3 Point Source). The 13 goals are listed from A to M.

The objectives are numbered for each goal (e.g. A-1, A-2, A-3, etc.).

Recommended Alberta Position Regarding Greenhouse Gases

The increasing concentration of man-made greenhouse gases is of global concern. At present, the federal position regarding greenhouse gases, as identified in the federal Green Plan, is to stabilize emissions of carbon dioxide and other greenhouse gases not covered by the Montreal Protocol at 1990 levels by the year 2000. Albertans want to ensure that the Canadian response regarding greenhouse gases is comprehensive and integrated as an international strategy which actively encourages global actions which:

- ▲ strengthens appropriate domestic emission controls and efficiency measures;
- ▲ encourages the use of science to reduce uncertainty;
- ▲ transfers Canadian pollution control technologies and environmental expertise;
- ▲ addresses all sources and responses; and
- ▲ assesses adaptation responses.

Alberta believes that, as a first step, Canada should rigorously apply cost-effective energy efficiency and conservation measures that make sense in their own right. This step also will contribute to Canada's improved competitiveness and movement toward broader sustainable development goals. Thus, as an interim step, Canada should apply energy conservation and efficiency measures at consumer, industrial and government levels.

As part of international efforts to reduce greenhouse gas emissions, Canada should encourage the international community to develop mechanisms to permit emission reductions through the most cost-effective options by both domestic actions and international initiatives. For example, to meet its international commitments, emission reduction credits should be given for Canada to reduce domestic emissions as well as for assisting less developed countries to reduce their emissions.

As part of the global solution and domestic actions, Alberta is committed to moving toward reduction of greenhouse gas emissions from current levels. Alberta and Canada should initiate immediate actions to clarify understanding of the timing, cost and benefits of a full range of reduction goals and measures. A federal-provincial multi-stakeholder process should be established to conduct this evaluation and to assess progress on a regular basis.

As a parallel activity, Alberta will develop more reliable provincial inventories of greenhouse gases, develop cumulative effects methodology, undertake detailed modelling using a mix of various measures and options, as well as developing effective and meaningful reporting mechanisms. This additional work will better define what provincial goals should be for the mix of energy-related emissions, the range of feasible options and the full costs and benefits of achieving these agreed-upon goals.

Finally, Albertans want to ensure that the responsibility for greenhouse gases created as a by-product of fuels or products produced for use in other parts of the country and internationally is shared by the users of those fuels or products. Albertans believe that the contribution of both personal consumption and human population growth to global warming must be included in the development of strategies to manage greenhouse gases.

To obtain copies of the complete report contact:

Clean Air Strategy for Alberta
Bag One, Mail Room, Main Floor
North Tower, Petroleum Plaza
9945-108 Street, Edmonton, Alberta
T5K 2G6
(403) 427-9793